

GENERALIZED SOLUTIONS AND ULTRAFUNCTIONS

VIERI BENCI *

The theory of distributions provides generalized solutions for problems which do not have a classical solution. However, there are problems which do not have solutions, not even in the space of distributions. As model problem you may think of

$$-\Delta u = u^{p-1}, \quad u > 0, \quad p \geq \frac{2N}{N-2}$$

with Dirichlet boundary conditions in a bounded open star-shaped set. Having this problem in mind, we construct a new class of functions called **ultrafunctions** in which the above problem has a (generalized) solution. In this construction, we apply the general ideas of Non Archimedean Mathematics and some techniques of Non Standard Analysis. Also, some possible applications of ultrafunctions are discussed.

*Dipartimento di Matematica Applicata "U. Dini", Università di Pisa email: benci@dma.unipi.it